

AMENDMENTS TO THE CLAIMS

Please amend claims 1, 10 and 28, and cancel claims 2-9, 11-27 and 29 which are as follows:

1. (Currently amended) A photonic crystal coupling defect waveguide comprising:

a photonic crystal including photonic crystal elements constituting a periodic structure and, for suppressing propagation of an electromagnetic field including light or ~~an~~ a radio wave of a specific wavelength or in a specific frequency range; and

a coupling waveguide including at least two waveguides, each of which includes a line defect that is a plurality of defects which are portions where the photonic crystal elements constituting the periodic structure of the photonic crystal are locally removed as line and forms the waveguide in the photonic crystal, and an input end or an output end for inputting and/or outputting the electromagnetic field and, which are mode-coupled to each other and, in which an electromagnetic field inputted to one of the waveguides causes an electromagnetic field to be propagated to the other waveguide,

wherein

by one of or more than one of (1) effectively changing a medium constant including one of or more than one of a dielectric constant, a refractive index, a conductivity and a magnetic permeability of the photonic crystal, (2) effectively changing size or shape of the photonic crystal elements, and (3) changing a lattice constant indicating a periodic interval of the photonic crystal elements,

(a) band structures of an even mode and an odd mode of the coupling waveguide are shifted with respect to a normalized frequency, or (b) the band structures of the even mode and the odd mode of the coupling waveguide are respectively changed at different degrees;

and by this, a difference in propagation constant between the even mode and the odd mode at a normalized frequency is made large, and a coupling length of a mode-coupled propagating electromagnetic wave which propagates in the coupling waveguide is made short,

further wherein

in the part of the photonic crystal including the part of or the whole of the coupling waveguide, the shape of the photonic crystal elements are not changed with respect to the another

part, and the lattice constant and the size of the photonic crystal elements are changed similarly and at a same rate as compared with the another part.

2.-9. (canceled)

10. (Currently amended) A photonic crystal coupling defect waveguide comprising:
a photonic crystal including photonic crystal elements constituting a periodic structure and,
for suppressing propagation of an electromagnetic field including light or a radio wave of a specific
wavelength or in a specific frequency range; and

a coupling waveguide including at least two waveguides, each of which includes a line
defect that is a plurality of defects which are portions where the photonic crystal elements
constituting the periodic structure of the photonic crystal are locally removed as line and forms the
waveguide in the photonic crystal, and an input end or an output end for inputting and/or outputting
the electromagnetic field and, which are mode-coupled to each other and, in which an
electromagnetic field inputted to one of the waveguides causes an electromagnetic field to be
propagated to the other waveguide,

wherein

by one of or more than one of (1) effectively changing a medium constant including one of
or more than one of a dielectric constant, a refractive index, a conductivity and a magnetic
permeability of the photonic crystal, (2) effectively changing size or shape of the photonic crystal
elements, and (3) changing a lattice constant indicating a periodic interval of the photonic crystal
elements,

(a) band structures of an even mode and an odd mode of the coupling waveguide are
shifted with respect to a normalized frequency, or (b) the band structures of the even mode and the
odd mode of the coupling waveguide are respectively changed at different degrees;

and by this, a difference in propagation constant between the even mode and the odd mode
at a normalized frequency is made large, and a coupling length of a mode-coupled propagating
electromagnetic wave which propagates in the coupling waveguide is made short, and

~~The the photonic crystal coupling defect waveguide according to claim 1,~~ further comprising

a region in which one of or more than one of an effective dielectric constant, a conductivity and a magnetic permeability of the photonic crystal are made variable by a control signal of an electromagnetic field including light or a radio wave and/or an electric field and/or a magnetic field applied from outside,

wherein a propagation constant of the electromagnetic wave and/or a degree of coupling can be controlled.

11.-27. (canceled)

28. (Currently amended) A photonic crystal coupling defect waveguide comprising: a photonic crystal including photonic crystal elements constituting a periodic structure and, for suppressing propagation of an electromagnetic field including light or a radio wave of a specific wavelength or in a specific frequency range; and

a coupling waveguide including at least two waveguides, each of which includes a line defect that is a plurality of defects which are portions where the photonic crystal elements constituting the periodic structure of the photonic crystal are locally removed as line and forms the waveguide in the photonic crystal, and an input end or an output end for inputting and/or outputting the electromagnetic field and, which are mode-coupled to each other and, in which an electromagnetic field inputted to one of the waveguides causes an electromagnetic field to be propagated to the other waveguide,

wherein

by one of or more than one of (1) effectively changing a medium constant including one of or more than one of a dielectric constant, a refractive index, a conductivity and a magnetic permeability of the photonic crystal, (2) effectively changing size or shape of the photonic crystal elements, and (3) changing a lattice constant indicating a periodic interval of the photonic crystal elements,

(a) band structures of an even mode and an odd mode of the coupling waveguide are shifted with respect to a normalized frequency, or (b) the band structures of the even mode and the odd mode of the coupling waveguide are respectively changed at different degrees;

and by this, a difference in propagation constant between the even mode and the odd mode at a normalized frequency is made large, and a coupling length of a mode-coupled propagating electromagnetic wave which propagates in the coupling waveguide is made short, and

~~The~~ the photonic crystal coupling defect waveguide according to ~~claim 1~~, further comprising

a region where one of or more than one of an effective dielectric constant, a conductivity and a magnetic permeability of the photonic crystal is made variable by heat applied from outside,

wherein a propagation constant of an electromagnetic wave and/or a degree of coupling can be controlled.

29. (canceled)